

## Editorial: Announcing a New LCA Guide

### Handbook on Life Cycle Assessment – Operational Guide to the ISO Standards

Jeroen Guinée

Centre of Environmental Science, Leiden University (CML); e-mail: [guinee@cml.leidenuniv.nl](mailto:guinee@cml.leidenuniv.nl)

In 1992, the Centre of Environmental Science – Leiden University (CML) collaborated with the Netherlands Organisation for Applied Scientific Research (TNO) and Fuels and Raw Materials Bureau (Bureau B&G) to produce a guide and background document on environmental life cycle assessment methodology (Heijungs et al. 1992). Since then, LCA methodology has progressed substantially. To address these ongoing developments, a large project was initiated and funded mainly by the Dutch central government. The project has recently resulted in an entirely new Dutch LCA Guide (written in English!). The project was carried out by CML, School of Systems Engineering, Policy Analysis and Management, Delft University of Technology, Interfaculty Department of Environmental Science of the University of Amsterdam and Bureau B&G, with contributions by the Institute for Environmental Studies of the Free University of Amsterdam, IVAM-Environmental Research, TNO and 2-0 LCA consultants.

The general aim of the new LCA Guide is to provide a 'cookbook' with operational guidelines for conducting a step-by-step LCA study as justified by a scientific background document based on the ISO Standards for LCA. The different ISO elements and requirements are made operational to what we judged as the 'best available practice' for each step. The new Guide gives guidelines for two levels of sophistication of LCA: a simplified and a detailed level; in addition, optional extensions to the detailed level are provided. The simplified level has been introduced for making faster and cheaper LCAs compared to detailed level LCAs. The simplified level may be good enough for certain applications. The guidelines for detailed LCA fully comply with the ISO standards, while the guidelines given for simplified LCA do not completely comply with these standards.

It would go beyond the scope of this announcement to discuss the specific results of the new Guide, but four highlights are briefly mentioned here.

**Mode of analysis.** In recent years, an intensive debate has taken place on two quite distinct interpretations, or modes of analysis, of LCA. The first is the question of what the share or contribution of one particular way of fulfilling a certain function is in the entire set of environmental problems as existing or as being created. Such type of LCA is referred to as doing a descriptive or retrospective LCA. The second interpretation puts an emphasis on change and is referred to as a change-oriented or prospective LCA. The analysis then addresses the environmental changes due to a change from or to one particular way of fulfilling a certain function. The new Guide addresses this difficult topic and related models extensively in a chapter on the theoretical foundations of LCA in Part 3 – Scientific background – and it elaborates one specific mode of analysis: change-oriented, structural choices.

**Procedures.** Proposals have been developed to embed LCA in procedural guidelines for a number of decision situations. When LCA results are used for decision-making, problems often rise on the authoritativeness of these results: stakeholders may not always accept the outcomes of the study. For this reason, LCA should be seen as a process in itself, with a process management geared to the specific character of the decision at stake. This work is new and will probably evolve further in time.

**Allocation.** In the new Guide, economic allocation is advised as baseline for all allocation situations in a detailed LCA. The economic

allocation procedure advised indicates the share of the various valuable flows in the total burden of a multiple process. In this method, for example, the share of each product in total sales of a firm is considered to indicate its share in the full existence of that firm.

**Fate modelling in characterisation of toxic releases.** Until recently, fate and exposure modelling was only partially or not included at all in characterisation factors for toxic releases. A model for including fate and exposure in these characterisation factors has been developed: the global, nested multi-media fate, exposure and effects model USES-LCA. It is based on the Uniform System for the Evaluation of Substances 2.0 (USES 2.0). USES-LCA was used to calculate ecotoxicity and human toxicity potentials for 181 substances.

The new LCA Guide consists of three parts. Part 1 – 'LCA in perspective' – provides a general introduction to LCA and includes a discussion on the possibilities and limitations of LCA. Part 2 consists of two parts, 2a ('Guide') and 2b ('Operational annex'). Part 2a provides an introduction to the procedural design of an LCA project, and guidelines on the best available practice for each of the steps involved in an LCA study, at the two levels of LCA sophistication. Part 2b operationalises most of the guidelines provided in Part 2a and provides the most up-to-date operational models and data associated with the best available practice for the two levels of sophistication, as a separate document. This has been done to facilitate updating of these operational elements, most of which are likely to change regularly. Part 3 provides the scientific background to the study, as well as a reasoned justification of all the choices made in designing a best available practice for each phase of an LCA.

Next to these books, on-line support is supplied through specific web-sites. For example, a spreadsheet including all characterisation factors and associated normalisation factors for the world, Europe or the Netherlands is available through <http://www.leidenuniv.nl/cml/lca2/index.html>.

Furthermore, LCA-software mainly intended for educational purposes has been developed and based on the new Guide (including matrix inversion technique for handling iterations). It can be downloaded for free for educational purposes at: <http://www.leidenuniv.nl/cml/ssp/cmlca.html>.

The Guide can be obtained in two ways. Currently available is the Internet version which can be downloaded from: <http://www.leidenuniv.nl/cml/lca2/index.html>. This version is entitled: 'Life cycle assessment – an operational guide to the ISO standards' and amounts to approximately 700 pages. Furthermore, Kluwer Academic Publishers (Dordrecht) will publish these reports as a practical handbook which is expected to be available at the end of this year. This version is entitled: 'Handbook on life cycle assessment – operational guide to the ISO standards'. The titles of the Internet version and the Kluwer books are slightly different, but the contents are the same. To order the Kluwer books, an E-mail can be sent to the author of this announcement and you will then receive a message back with ordering information as soon as the books are available.

#### References

- Heijungs R, Guinée J, Huppes G, Lankreijer RM, Udo de Haes HA, Wegener Sleswijk A, Ansems AMM, Eggels PG, Duin R van, Goede HP de (1992): Environmental life cycle assessment of products. Guide and backgrounds. CML, Leiden University, Leiden, The Netherlands